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man. A knowledge of natural phenomena is now regarded as a necessary qualification in a man who would instruct others in natural sciences. At some future time a knowledge of social and industrial phenomena will be considered a desirable qualification in a writer on economic topics: when that happy time comes, we will hear less about 'some one snapping his fingers' and turning the world upside down.

Only one other point. N. M. B. says I gather facts to suit a preconceived theory. If he had read the book more carefully, he would have learned the true state of the case; namely, that I began my investigation with a theory opposed to labor organizations, but was converted from my former opinion by an overwhelming and irresistible array of facts disclosed by serious investigation.

N. M. B. is not the only one who exhibits gross carelessness in reviews. The fault is common; and my own conscience pricks me when I remember one critique which I wrote several years ago. But it is time to emphasize the duty which a reviewer owes not merely to the author, but to the general public, to master the contents of a book before presenting an estimate of it to the world. RICHARD T. ELY.

Johns Hopkins university,
Baltimore, Oct. 22.

In a criticism of Professor Ely's 'Labor movement in America,' by N. M. B., in your issue of Oct. 15, it is stated that the evils which socialists ascribe to 'the institution of private property' are not the true cause of the evils or labor troubles, but that they are caused, as Aristotle held, by the 'wickedness of human nature.' No standard for good and bad is given by N. M. B., and the reader is left at a loss what 'wickedness' may be according to Aristotle or N. M. B. It is fair to presume that selfishness—utter, brutal, unmodified selfishness, the mere following out of the brutal, selfish instincts of man, regardless of the welfare or interest of other selves—is what Aristotle and N. M. B. mean.

"Every one for himself, the devil take the hindmost," is, then, the expression of the greatest wickedness or worst trait of human nature: that is individualism, pure and simple. Opposed to that, on the other extreme, as absolute goodness, would be altruism. Between the two, as the golden mean, is equity, or socialism, — live and let live; each for all, and all for each. The history or evolution of human nature—that is, the ego-altruistic or ethical part of human nature—is simply a development from the utter selfishness of the lowest brutes to the social instinct of man. That is the very thing that makes man, or the human character of the animal man. As man develops from a mere individualist, he becomes, therefore, better according to the degree in which he develops his social or equity nature; that is, as he grows to be a socialist. That answers Mr. N. M. B.'s question, whether these labor agitators consider it is the wickedness (total depravity?) of man that needs to be reformed, or the economic-social institutions. The answer is, Both. Human nature has developed already from a low, beastly, selfish savage, to a golden-rule man; but our economic institutions are not yet brought into accord with that development of our human nature. To do that is the work and objects of the socialistic agitators. When that is done, it will again have a reflex action on our nature (like all material environment or social institutions), and help to make human nature still better than it now is.

ONE OF THE AGITATORS.

On the figures illustrating zoölogical literature.

When a zoölogist takes up his pen, brush, or pencil with the intention of executing a drawing of a zoölogical subject, either new or old, with the view of publishing it to the world, he assumes, in my opinion, one of the greatest responsibilities that can fall to the lot of man. This responsibility is none the less, of course, when the zoölogist is obliged to review the work done for him in this way by others, and applies to all manner of figurative illustration for zoölogical literature. On the other hand, I think science is fully as much in debt to him who furnishes her literature with an absolutely accurate, clear, and instructive figure, as she is to the writer who produces in type a full, trustworthy, and comprehensive description of the same subject. And, indeed, in many particulars, a good drawing of any object in nature, in the vast majority of cases, leaves a much more lasting impression upon the mind of the student than does sometimes the most lucid of descriptions. For instance, if we had never seen an elephant, nor a good figure of one, how different would be the ideas of different persons, were they to attempt to draw an elephant simply from a description, however good that description might be! How important it is, then, that original figures in zoölogy, including all its branches, should be as perfect and correct likenesses of the object they depict, as possible!

The writer, who has thus far contributed some thousand original drawings to the various departments of zoölogy, feels that no one more than himself needs the greatness of this responsibility laid before him, and I am fully aware of the shortcomings of some of my early attempts; but, be it said in justice to myself, I believe at the present writing duplicates, either in press or in the hands of publishers, of all of those that evidently required special improvement, are now furnished.

Great encouragement is held out in the future to all naturalists, in the numerous methods that are being perfected, by means of which the originals are accurately transferred to metal without the interference of another hand; and more especially does this encouragement come to those naturalists who take great pains, and are skilful with their work.

Electrotypy, however, and the ease it affords for reproducing all manner of work, threaten such scientists and naturalists who illustrate their own writings, with another danger, for which steps must soon be taken to protect them. This danger comes more especially from that class of writers who are either indifferent artists or will not take the time to make their own figures. Such people are apt to become very lax in the principles which pertain even to the matter of courtesy in the premises, and often, without your leave or by your leave, copy the drawings of others by electrotypy to illustrate their own books, which latter are only too often hastily made in other particulars.

And should an author have his writings and carefully executed drawings come out from the government press, why then these people to whom I allude seem to think that they are under no obligation of any kind whatever, and immediately plunder any thing they see fit to use. This is a great injustice to the original artist and describer: for in time it is sure to rob him of his right, as government publications are rarely seen by the public at large; and the first thing he knows his unacknowledged draw-

ings are in use in class-books in half the schools in the country.

Then, again, it may operate in some such way as this. Take Professor Coues's first edition of his 'Key to North American birds.' This author says in his preface, "Professor Baird kindly offered me the use of all the illustrations of his late review, while Professor Agassiz generously placed at my disposal the plates accompanying Mr. Allen's 'Memoir on the birds of Florida.' Several of the woodcuts have been taken from Professor Tenny's 'Manual of zoölogy,' with the author's permission; and a few others have been contributed by Messrs. Lee & Shepard. With a few exceptions, the rest of the illustrations have been drawn from nature by the author, and engraved by Mr. C. A. Walker."

Now, here is a work illustrated by 238 figures, 40 of which at least are due to the unequalled genius of Audubon and Wilson; and yet their names are not even so much as mentioned in the preface, or anywhere else in the book, in connection with its illustrations! I will say here in justice to Coues, however, that he amply corrected this in the second edition of his 'Key,' but how does it operate? Why, this way: six or seven years afterwards Prof. A. S. Packard publishes a work entitled 'Zoölogy,' wherein the chapter devoted to birds has 22 figures, at least 14 of which are reduced cuts from either Audubon or Wilson, but each one accredited as being "from Coues's 'Key.'" I hold this to be altogether wrong, and a great injustice to an author or artist naturalist, either living or dead. It is quite as easy to write fig. 465, "Summer duck—from Coues's 'Key,' after Audubon," because that perpetuates the genius of a great artist, and relieves Dr. Coues of the responsibility of having drawn the bird in question!

Foreign authors are exceedingly careful about such matters in their educational works upon biology, for they seem to appreciate the fact that to be otherwise is taking, to say the very least of it, an unfair advantage of a special worker in science, who may not care to publish 'Nature series' for the public. The very recent and admirable publications of Mivart, Claus (A. Sedgwick's translation), Wiedersheim (W. N. Parker's translation), and F. Jeffrey Bell, will bear me out in this.

On the other hand, some of our American authors fully deserve the sharpest of criticism for their carelessness in such matters, and in other cases more severe handling where it actually comes within the operation of the law.

As an example of the majority of the suggestions and views that I have just put forth, let us take a little work just gotten out by Professor Packard for the use of American youth in the schools, and a sort of first steps in zoölogy (steps surely that should be, above all others, in the right direction). I refer to the 'First lessons in zoölogy' (New York, Holt). In the present connection, I have nothing to do with the long list of misstatements in biology in this apparently very hastily written book, but draw upon it solely to illustrate what I have said about zoölogical figures.

Dr. Packard, in its preface, makes a very shiftless acknowledgment of some of the authorities for the illustrations, but leaves a very much larger number where he has completely ignored the artists, and finally says that eight of them were drawn by himself; trusting, I presume, that the students would choose from among the most trustworthy and best of

the unacknowledged ones these eight, and accredit the author with them.

I observe among several others quite a number of the wonderfully instructive drawings of Prof. E. S. Morse, some of C. V. Riley's, two of my own (figs. 196, 197), a drawing by Coues (fig. 203), and others by Hornaday, Rymer Jones, Owen, and many others, none of which receive a single word of acknowledgment as being authority for the originals.

But now a word as to some of the drawings themselves,—illustrations that are to be presented to classes of our children, and from which they are supposed to gain or derive their *first* notions of animal forms. Take fig. 211, for example, said to be a 'head of a dove,' but of rather a raptorial variety, I should mildly suggest. Fig. 212, on the same page, looks, to my mind, far more like the claw of a young lobster than the head of a cockatoo, which it is intended to represent. There is hardly a school-boy in America, who has ever given sufficient attention to the matter, who would not know at a glance that the 'Lobate foot of the coot' (fig. 208) is absolutely incorrect in important particulars.

As the author says in the preface that it has been 'copied by electrotypy,' I do not know the authority for the skeleton of the wild ass (fig. 251), but it certainly gives the impression that the symphysis of the pelvis is not joined, and it strikes me that a better and far safer illustration of the mammalian skeleton could have been chosen to meet the end in view. But enough; for I believe I have fairly shown that surely these are not the characters of trustworthy illustrations of zoölogical subjects to bring into the class-room. And I must believe that if any of the youthful students of this little work become naturalists by profession in after-life, and look back upon the drawings I have cited, they will agree with Professor Packard, as he expresses himself on its p. 142, and with myself, after I had seen the figures in question, that, "even after the lancelet came into being, the steps by which the genuine backboned family became recognized in animal society were painful, and only in a degree successful."

R. W. SHUFELDT.

Fort Wingate, N. Mex., Oct. 9.

The Charleston earthquake.

I suggest an experiment which will, I think, clear up the ideas of many persons who may witness it, as to the source of the phenomena of the Charleston earthquake.

Let a large sheet of glass (thick plate-glass is perhaps best) be held in a position nearly horizontal. Place an alcohol-lamp beneath it, near enough to heat it. Long before it is hot enough to soften, it will visibly bend, and then break with noise and more or less shock. It will be violently agitated.

To apply this, suppose that dense strata of rock exist at a great depth below the earth's surface, underlying the coast region from the Alleghanies far out under the ocean; that in the course of ages portions of these sheets hundreds of feet thick, hundreds of miles wide, and perhaps a thousand miles long, have been slowly increasing in temperature, and expanding or endeavoring to expand. For a long time, and to a considerable amount of expansion over such large areas, the tendency to expand merely makes the rock denser; i.e., sets up internal strains, compressing the substance of the rock as confined—a mile square of it, fifty miles square of it—to the